Syllabus - SOIL 4683
Soil, Water, and Weather
Spring 2018

Instructor: Tyson E. Ochsner
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Course website: http://soilphysics.okstate.edu/teaching/soil-4683/

TAs: Briana Wyatt, briana.wyatt@okstate.edu, 267 Agricultural Hall

Course meeting time and location: 9:30-10:20, MWF, 401 Agricultural Hall

Office hours:
You may call or e-mail to schedule an appointment. You are also welcome to stop by my office at any time. I can usually make time to talk with you.

Course description:
This course provides an introduction to the physics of the soil-plant-atmosphere continuum. The focus is on soil, its physical properties, and their interactions with water and weather in terrestrial ecosystems. Processes examined include: precipitation, rainfall interception, raindrop impact, infiltration, runoff, drainage, soil water storage, evaporation, transpiration, solar radiation partitioning, soil temperature, and heat transfer near the land surface. Interactions of these processes with plant growth, solute transport, water quality, and greenhouse gas emissions are considered. Quantitative analysis is emphasized with applications in soil and environmental science, agronomy, ecology, hydrology, and climatology.

Prerequisites: General Physics (PHYS 1114) and Fundamentals of Soil Science (SOIL 2124)

Course objectives: Students should develop and demonstrate the ability to —

1. Define the primary processes in the soil water balance, the primary processes in the surface energy balance, and the fundamental physical properties of the soil.

2. Relate the processes in the soil water balance and the surface energy balance to each other and to the soil physical properties, and relate all of these components to issues of agricultural and environmental concern.

3. Quantify the magnitude and direction of water and energy flows in the soil-plant-atmosphere continuum and calculate values for soil physical properties.
Performance evaluation:
Student performance will be evaluated based on class participation, homework assignments, two mid-term exams, and a final exam. Class participation will be assessed by the instructor based on three criteria: 1) presence, 2) preparation, and 3) professionalism. To receive full credit for class participation students must:

1) be present at every class period, except for officially permitted absences;
2) be fully prepared to learn, having read and studied the assigned content (text or video) before class and completed all assigned tasks;
3) and be completely professional in their conduct and work products.

Students taking the course for graduate credit will have extra homework. The maximum points that can be earned for each activity are listed below. To earn an overall grade of "A" for the course requires 450 points, a "B" requires 400 points, and so on.

<table>
<thead>
<tr>
<th>Possible points</th>
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<tbody>
<tr>
<td>Class participation</td>
<td>100</td>
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<tr>
<td>Homework</td>
<td>100</td>
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<tr>
<td>Mid-term exam 1</td>
<td>100</td>
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<tr>
<td>Mid-term exam 2</td>
<td>100</td>
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<tr>
<td>Final exam</td>
<td>100</td>
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Class policies:
1. It will be necessary to attend all scheduled class periods and take all exams at their assigned time in order to fulfill the requirements and receive an acceptable grade.
2. Students missing any class period should make arrangements with other students enrolled in the class to obtain lecture notes.
3. Make-up exams will be available for officially permitted absences that occur on the scheduled exam dates and times. Valid reasons for absences include, but are not limited to, serious illnesses, death in the immediate family, and university-sanctioned extracurricular activities. Students are responsible for providing valid written justification of the permitted absence prior to the exam.

Important dates:
Exam 1                   Wednesday, February 21
Exam 2                   Friday, April 11
Final exam               Wednesday, May 9
                          8:00 to 9:50 a.m.
Textbook:
The textbook for this course is “Rain or Shine: An introduction to soil physical properties and processes” by Tyson E. Ochsner. A free electronic version of the textbook will be made available to all students via Dropbox. Students are welcome to print a hard copy of the textbook, but some of the textbook content will likely be updated throughout the semester. The textbook version available on Dropbox will always be the most current version.

Participation Cards:
For each chapter in the textbook, students will study the chapter and associated materials (e.g. videos, webpages, or handouts) and complete participation cards before class to earn participation points. In this class, a participation card is a 3 inch by 5 inch index card on which the student writes his or her name and the date, the relevant chapter number, and responses to three prompts: the star prompt, the question mark prompt, and the arrow prompt.

🌟 What is the most interesting or important concept in the assigned content?
❓ What question or questions did this content bring to your mind?
➡️ Describe one way that this content is relevant to you or others.

Participations cards that meet the instructor’s expectations for content and style are graded with a “check mark”, which is equivalent to a grade of 90%. Participation cards that do not meet expectations receive a “check minus”, i.e. 80%. Participation cards that exceed expectations receive a “check plus”, i.e. 100%.

Extra Homework Assignment for Graduate Students:
Each graduate student must create a 2-10 minute educational video that explains, reinforces, or extends a topic or equation from the textbook. This video must be complementary to and not redundant with any of the existing videos on the Oklahoma State University Soil Physics Youtube Channel (link). The video file must be in MP4 format with a 16:9 aspect ratio and must respect all applicable copyright laws. The instructor will post selected student-created videos to the Oklahoma State University Soil Physics Youtube Channel.